

Volume 527
June 17, 1988

VASOACTIVE INTESTINAL PEPTIDE AND RELATED PEPTIDES^a

Editors

SAMI I. SAID AND VIKTOR MUTT

CONTENTS

Preface. By SAMI I. SAID	xiii
--------------------------------	------

Part I. Chemistry, Synthesis, Biosynthesis, and Structure-Activity Relationships

Vasoactive Intestinal Polypeptide and Related Peptides: Isolation and Chemistry. By VIKTOR MUTT	1
Synthesis of Vasoactive Intestinal Peptide and Related Peptides. By MIKLOS BODANSZKY.....	20
Immunochemical and Biochemical Properties of Purposely Designed Synthetic Peptides. By NOBORU YANAIHARA, CHIZUKO YANAIHARA, MINORU HOSHINO, TOHRU MOCHIZUKI, AND KAZUAKI IGUCHI	29
Potent Long-Acting Growth Hormone Releasing Factor Analogues. By J. RIVIER, C. RIVIER, R. GALYEAN, G. YAMAMOTO, and W. VALE	44
Conformational Analysis of Vasoactive Intestinal Peptide and Related Fragments. By ALAIN FOURNIER, JOHN K. SAUNDERS, YVAN BOULANGER, and SERGE A. ST-PIERRE	51
The Regulation of Vasoactive Intestinal Peptide Synthesis in Neuroblastoma and Chromaffin Cells. By MARGERY C. BEINFELD, PHILLIP L. BRICK, ALLYN C. HOWLETT, I. LEE HOLT, REBECCA M. PRUSS, JOSEPH R. MOSKAL, and LEE E. EIDEN	68
Biosynthesis and Regulation of Expression: The Vasoactive Intestinal Peptide Gene. By ILLANA GOZES.....	77
Complete Nucleotide Sequence of Human Vasoactive Intestinal Peptide/PHM-27 Gene and Its Inducible Promoter. By TAKASHI YAMAGAMI, KENZO OHSAWA, MIKIO NISHIZAWA, CHIYOKO INOUE, EISUKE GOTOH, NOBORU YANAIHARA, HIROSHI YAMAMOTO, and HIROSHI OKAMOTO.....	87

^aThis volume is the result of a conference entitled Vasoactive Intestinal Peptide and Related Peptides, which was held by the New York Academy of Sciences on March 2-4, 1987, in New York City.

Part II. VIP as a Neuropeptide

Colocalization of VIP with Other Neuropeptides and Neurotransmitters in the Autonomic Nervous System. <i>By</i> M. COSTA, J. B. FURNESS, I. L. GIBBONS, J. L. MORRIS, J. C. BORNSTEIN, I. J. LLEWELLYN-SMITH, and R. MURPHY	103
Vasoactive Intestinal Peptide as a Mediator of Intercellular Communication in the Cerebral Cortex: Release, Receptors, Actions, and Interactions with Norepinephrine. <i>By</i> PIERRE J. MAGISTRETTI, MONIKA M. DIETL, PATRICK R. HOF, JEAN-LUC MARTIN, JOSÉ M. PALACIOS, NICOLAS SCHAAD, and MICHEL SCHORDERET	110
Functional Implications of the Radial Organization of VIP-Containing Neurons in the Neocortex. <i>By</i> JOHN H. MORRISON	130
Vasoactive Intestinal Peptide in the Peripheral Nervous System. <i>By</i> F. SUNDLER, E. EKBLAD, T. GRUNDITZ, R. HÅKANSON, and R. UDDMAN	143
Glucagon and Related Peptides: Molecular Structure and Biological Specificity. <i>By</i> D. BATAILLE, P. BLACHE, F. MERCIER, C. JARROUSSE, A. KERVAN, M. DUFOUR, P. MANGEAT, M. DUBRASQUET, A. MALLAT, S. LOTERSZTAJN, C. PAVOINE, and F. PECKER	168
Helodermin-like Peptides. <i>By</i> PATRICK ROBBERECHT, ANDRÉ VANDERMEERS, MARIE-CLAIRE VANDERMEERS-PIRET, PHILIPPE GOURLET, ANNICK CAUVIN, PHILIPPE DE NEEF, and JEAN CHRISTOPHE	186

Part III. Mechanisms of Action and Receptors

Distribution and Pharmacology of Vasoactive Intestinal Peptide Receptors in the Brain and Pituitary. <i>By</i> JACQUELINE BESSON	204
Regulation of the Vasoactive Intestinal Peptide Receptor. <i>By</i> G. ROSSELIN, A. ANTEUNIS, A. ASTESANO, C. BOISSARD, P. GALI, G. HEJBLUM, and J. C. MARIE	220
Vasoactive Intestinal Peptide Receptors in Pancreas and Liver: Structure-Function Relationship. <i>By</i> JEAN CHRISTOPHE, MICHAL SVOBODA, MAGALI WELBROECK, JACQUES WINAND, and PATRICK ROBBERECHT	238
Characterization of Vasoactive Intestinal Peptide Receptors in Nervous and Immune Systems. <i>By</i> M. S. O'DORISIO, T. M. O'DORISIO, C. L. WOOD, J. C. BRESNAHAN, M. S. BEATTIE, and L. B. CAMPOLITO	257

Structural Characterization of Vasoactive Intestinal Peptide Receptors from Rat Lung Membranes. <i>By</i> GONUL VELİÇELEBİ, SARASWATHI PATTHI, SALLY PROVOW, MICHAEL AKONG, and SUSAN SIMERSON.....	266
Regulatory Aspects of the Vasoactive Intestinal Peptide Receptor in Lung. <i>By</i> SUDHIR PAUL, JOANNE CHOU, and SAMI I. SAID	282
Molecular Analysis of Vasoactive Intestinal Peptide Receptors: A Comparison with Receptors for VIP-Related Peptides. <i>By</i> MARC LABURTHE and ALAIN COUVINEAU.....	296
Anatomical Distribution of Vasoactive Intestinal Peptide Binding Sites in Peripheral Tissues Investigated by <i>in Vitro</i> Autoradiography. <i>By</i> R. F. POWER, A. E. BISHOP, J. WHARTON, C. O. INYAMA, R. H. JACKSON, S. R. BLOOM, and J. M. POLAK	314

Part IV. Physiological Role of VIP and Related Peptides

Mechanism of VIP-Stimulated Chloride Secretion by Intestinal Epithelial Cells. <i>By</i> RICHARD D. MCCABE and KIERTISIN DHARMSATHAPHORN	326
Neurotransmitter Regulation of Ionic Channels in Freshly Dissociated Smooth Muscle Cells. <i>By</i> STEPHEN M. SIMS, MICHEL B. VIVAUDOU, LUCIE H. CLAPP, NANCY L. LASSIGNAL, JOHN V. WALSH, JR., and JOSHUA J. SINGER.....	346
Vasoactive Intestinal Peptide and Other Peptides as Neuromodulators of Colonic Motility in the Guinea Pig. <i>By</i> J. A. LOVE, V. L. W. GO, and J. H. SZURSZEWSKI.....	360
Vasoactive Intestinal Peptide: Transmitter of Inhibitory Motor Neurons of the Gut. <i>By</i> J. R. GRIDER and G. M. MAKHLOUF	369
Role of Vasoactive Intestinal Peptide and Peptide Histidine Isoleucine in the Cerebral Circulation. <i>By</i> LARS EDVINSSON, JAMES MCCULLOCH, PAUL A. T. KELLY, and URSULA I. TUOR	378
Vasoactive Intestinal Polypeptide and the Reproductive System. <i>By</i> JAN FAHRENKRUG, BENT OTTESEN, and CONNIE PALLE.....	393
Vasoactive Intestinal Peptide in the Heart. <i>By</i> W. G. FORSSMANN, J. TRIEPEL, C. DAFFNER, CH. HEYM, P. CUEVAS, M. I. M. NOBLE, and N. YANAIHARA	405
Vasoactive Intestinal Peptide as a Coronary Vasodilator. <i>By</i> THOMAS C. SMITHERMAN, GREGORY J. DEHMER, and SAMI I. SAID	421
Neuroendocrine Significance of Vasoactive Intestinal Polypeptide. <i>By</i> SEYMOUR REICHLIN.....	431

Vasoactive Intestinal Peptide in the Lung. By SAMI I. SAID.....	450
Vasoactive Intestinal Peptide and Renin Secretion. By JAMES P. PORTER and WILLIAM F. GANONG	465
The Role of Vasoactive Intestinal Peptide and Other Neuropeptides in the Regulation of the Immune Response <i>in Vitro</i> and <i>in Vivo</i> . By ANDRZEJ M. STANISZ, RAFFAELE SCICCHITANO, and JOHN BIENENSTOCK.....	478
Vasoactive Intestinal Peptide as a Modulator of Lymphocyte and Immune Function. By C. A. OTTAWAY.....	486

Part V. Clinical Significance: Relationship to Human Disease

Effect of Vasoactive Intestinal Peptide in Man. By GUENTER J. KREJS.....	501
The Morphology and Neuroendocrine Profile of Pancreatic Epithelial VIPomas and Extrapancratic, VIP-Producing, Neurogenic Tumors. By ENRICO SOLCIA, CARLO CAPELLA, CRISTINA RIVA, GUIDO RINDI, and JULIA M. POLAK.....	508
Vasoactive Intestinal Peptide Secreting Tumors: Pathophysiological and Clinical Correlations. By S. R. BLOOM, Y. YIANGOU, and J. M. POLAK	518
Somatostatin and Analogues in the Treatment of VIPoma. By T. M. O'DORISIO, T. S. GAGINELLA, H. S. MEKHJIAN, B. RAO, and M. S. O'DORISIO	528
Vasoactive Intestinal Peptide in Sepsis and Shock. By ARTHUR REVHAUG, IDAR LYGREN, TROND G. JENSSEN, KARL-E. GIERCKSKY, and PER G. BURHOL	536
Dysfunction of the Gastrointestinal Tract: Vasoactive Intestinal Peptide in Peristalsis and Sphincter Function. By P. BIANCANI, M. C. BEINFELD, D. H. COY, C. HILLEMEIER, J. H. WALSH, and J. BEHAR	546
Vasoactive Intestinal Peptide as a Regulator of Exocrine Function and as a Possible Factor in Cystic Fibrosis. By PETER HEINZ-ERIAN and SAMI I. SAID.....	568
VIP ₁₋₁₂ Is a Ligand for the CD ₄ /Human Immunodeficiency Virus Receptor. By PAOLA SACERDOTE, MICHAEL R. RUFF, and CANDACE B. PERT.....	574

Part VI. Poster Papers

Vasoactive Intestinal Polypeptide Increases Inositol Phospholipid Breakdown in the Rat Superior Cervical Ganglion. By S. AUDIGIER, C. BARBERIS, and S. JARD	579
---	-----

The <i>in Vitro</i> Proteolytic Processing of Vasoactive Intestinal Polypeptide by Rat Spinal Cord Homogenate. By G. F. BARBATO, F. JORDAN, and B. R. KOMISARUK	582
Vasoactive Intestinal Polypeptide Given Intrathecally Increases the Secretion of Oxytocin and Vasopressin in Rats. By B. BARDRUM, B. OTTESEN, J. FAHRENKRUG, and A.-R. FUCHS ...	586
Neurogenic Vasoactive Intestinal Peptide Dilation in a Resistance Artery. By JOHN A. BEVAN	588
Postprandial Portal Venous Blood Flow and Portal Plasma Vasoactive Intestinal Peptide in Man. By CARL HOLM, BJÖRN BIBER, BENGT GUSTAVSSON, IAN MILSOM, OLA WINSÖ, and JAN FAHRENKRUG	591
Regulation of Activity-Linked Neuronal Survival by Vasoactive Intestinal Peptide. By DOUGLAS E. BRENNEMAN	595
Synthesis and Secretion of Vasoactive Intestinal Peptide and VIP-Prohormone by Fetal Rat Brain Cells in Culture. By L. CACICEDO, M. J. LORENZO, M. T. DE LOS FRAILES, S. REICHLIN, and F. SANCHEZ FRANCO	598
Vasoactive Intestinal Peptide Receptor Activity in Intestinal Cells Isolated from Human Fetuses with Cystic Fibrosis: Comparison with the Liver. By E. CHASTRE, S. EMAMI, W. BAWAB, D. FAGOT, H. BODÉRE, F. MULLER, A. BOUÉ, G. ROSSELIN, and C. GESPACH	600
Immunohistochemical Localization of Vasoactive Intestinal Peptide in the Dogfish Rectal Gland. By STUART R. CHIPKIN, JEFFEREY S. STOFF, and NEIL ARONIN	605
Characterization of Vasoactive Intestinal Peptide Receptors in the Pancreatic AR 4-2J Cell Line. By MICHAL SVOBODA, PATRICK ROBBERECHT, FRANÇOISE GOMEZ, JACQUES WINAND, and JEAN CHRISTOPHE	608
Helodermin and Helospectin-like Peptides Present in the Venom of the Lizards <i>Heloderma horridum</i> and <i>Heloderma suspectum</i> . By ANDRÉ VANDERMEERS, YASSIR BOUNJOUA, MARIE-CLAIRE VANDERMEERS-PIRET, PHILIPPE GOURLET, ANNICK CAUVIN, PATRICK ROBBERECHT, and JEAN CHRISTOPHE	612
Colocalization of Vasoactive Intestinal Peptide- and Substance P-Containing Nerves in Cat Airways. By RICHARD D. DEY	617
Amino Acid Sequence of a Biologically Active Vasoactive Intestinal Peptide from the Elasmobranch <i>Scyliorhinus canicula</i> . By R. DIMALINE, JANICE YOUNG, D. T. THWAITES, CAROLINE M. LEE, and M. C. THORNDYKE	621
PreproVIP-Derived Peptides in Man and Rat. By R. DIMALINE, LYNNE VOWLES, and JANICE YOUNG	624

Vasoactive Intestinal Peptide: A Possible REM Sleep Factor. By RENÉ DRUCKER-COLÍN, OSCAR PROSPÉRO-GARCÍA, RUY PÉREZ-MONTFORT, and MARÍA T. PACHECO.....	627
Release of Vasoactive Intestinal Peptide in Response to Suckling. By MAUD ERIKSSON, TOMAS HÖKFELT, BRANKA PROSLONCEC, and KERSTIN UVNÄS-MOBERG	631
Vasoactive Intestinal Peptide Protects Against HCl-Induced Pulmonary Edema in Rats. By HUSSEIN D. FODA, TOMOAKI IWANAGA, LE-WEN LIU, and SAMI I. SAID	633
Release of Vasoactive Intestinal Peptide during Hyperdynamic Sepsis in Conscious, Awake Dogs. By MICHELE FUORTES, MARION A. BLANK, THOMAS W. POLLOCK, BEVERLY A. PAZUR, MARVIN A. McMILLEN, BERNARD M. JAFFE, and THOMAS M. SCALEA.....	637
Vasoactive Intestinal Peptide Stimulation of Feline Renal Adenylate Cyclase: Inhibitory Effects of (4Cl-D-Phe ⁶ , Leu ¹⁷)VIP. By NINA M. GRIFFITHS, J. RIVIER, and N. L. SIMMONS.....	640
Vasoactive Intestinal Peptide-Containing Nerve Fibers in Bone and Periosteum May Be Adrenergic. By ESTHER L. HILL and ROBERT ELDE.....	643
Colonic Vasoactive Intestinal Peptide-Containing Nerves in Crohn's Disease and Ulcerative Colitis. By TIMOTHY R. KOCH, LISA GO, J. AIDAN CARNEY, and VAY LIANG W. GO.....	646
Analgesia Produced by Vasoactive Intestinal Peptide Administered Directly to the Spinal Cord in Rats. By BARRY R. KOMISARUK, CYNTHIA BANAS, STEPHEN B. HELLER, BEVERLY WHIPPLE, GUY F. BARBATO, and FRANK JORDAN ..	650
Production of Biologically Active Secretin in <i>E. coli</i> . By H. OLSSON, P. LIND, C. HENRICHSON, B. ÖSTERLÖF, G. POHL, G. KLEIN, H. JÖRNVALL, V. MUTT, M. UHLÉN, and M. LAKE	655
Vasoactive Intestinal Peptide and Secretin Receptors in Rat Brain: Localization and Second Messenger Production. By TERRY W. MOODY, REINA GETZ, ROBERT T. FREMEAUX, JR., and MARGARET M. SHAFFER	657
Design, Synthesis, and Analysis of Secondary Structure Based Vasoactive Intestinal Peptide Analogues. By GARY F. MUSSO, THOMAS C. RYSKAMP, SARASWATHI PATTHI, SALLY PROVOW, and GÖNÜL VELİÇELFELİ.....	660
Vasoactive Intestinal Peptide Receptors in Human Platelet Membrane: Characterization of Binding and Functional Activity. By N. ERCAL, M. S. O'DORISIO, A. VINIK, T. M. O'DORISIO, and M. KADROFSKE	663

The Glycoprotein Nature of the Vasoactive Intestinal Peptide Binding Site: Role of Carbohydrates in VIP Binding on HT 29-D4 Cells. <i>By</i> A. EL BATTARI, J. LUIS, J. M. MARTIN, J. FANTINI, J. M. MULLER, J. MARVALDI, and J. PICHON.....	667
Localization of Vasoactive Intestinal Peptide Binding Sites in Rat Pancreatic Islets by Computer-Assisted Analysis of Electron Microscopy Video-Autoradiographs. <i>By</i> ANNY ANTEUNIS, ANY ASTESANO, GILLES HEJBLUM, JEAN-CLAUDE MARIE, BERNARD PORTHA, and GABRIEL ROSSELIN	672
A Computer-Assisted Analysis of Ultrastructural Autoradiographs Applied to the Localization of Vasoactive Intestinal Peptide Binding Sites in Pancreatic Acini. <i>By</i> GILLES HEJBLUM, ANNY ANTEUNIS, ANY ASTESANO, JEAN-CLAUDE MARIE, BERNARD PORTHA, and GABRIEL ROSSELIN.....	674
Human Lung Cancer Cell Lines Have Vasoactive Intestinal Peptide Receptors. <i>By</i> MARGARET M. SHAFFER, LOUIS Y. KORMAN, ROBERT T. JENSEN, ZHI CHAO ZHOU, DESMOND N. CARNEY, and TERRY W. MOODY	676
A Synthetic Peptide, L-8-K, and Its Antibody Both Inhibit the Specific Binding of Vasoactive Intestinal Peptide to Hamster Pancreatic Cancer Cells. <i>By</i> HARBANS SINGH, ASHOK KUMAR, COURTNEY M. TOWNSEND, JR., ZAHIDA SAMAD, and POMILA SINGH.....	679
Dopamine-Vasoactive Intestinal Peptide Interactions on Mixed GH-PRL Pituitary Adenomas. <i>By</i> D. TATER, G. CHARPENTIER, M. KUJAS, G. BESSON, G. ROSSELIN, and J. P. BERCOVICI.....	682
Vasoactive Intestinal Peptide Prevents Increase in Pulmonary Artery Pressure during Hypoxia in Newborn Lambs. <i>By</i> P. L. TOUBAS, K. C. SEKAR, R. E. SHELDON, N. PAHLAVAN, and S. I. SAID.....	686
Index of Contributors.....	689

Financial assistance was received from:

- MEIJI SEIKA KAISHA, LTD. (JAPAN)
- MERCK SHARP AND DOHME RESEARCH LABORATORIES
- MERRELL DOW RESEARCH INSTITUTE
- MILES LABORATORIES
- SANDOZ PHARMACEUTICALS
- UNIVERSITY OF OKLAHOMA, COLLEGE OF MEDICINE
- NATIONAL INSTITUTE OF NEUROLOGICAL AND COMMUNICATIVE DISORDERS AND STROKE (NEUROSCIENCES PROGRAM)
- NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES (ASTHMA & ALLERGY BRANCH)